BMP #133 - Temporary Stream Crossing

DESCRIPTION

Targeted Pollutants

- ● Sediment
- ○ Phosphorus
- ○ Trace metals
- ○ Bacteria
- ◒ Petroleum hydrocarbons

A temporary stream crossing is a bridge or culvert across a stream or watercourse for short-term use by construction vehicles or heavy equipment. Vehicles moving over unprotected stream banks will damage the bank, thereby releasing sediments and degrading the stream bank. A stream crossing provides a means for construction vehicles to cross streams or watercourses without moving sediment to streams, and without damaging the streambed or channel, or causing flooding.

APPLICATIONS

Physical Limits

Drainage area	N/A
Max slope	N/A
Min bedrock depth	2 ft
Min water table	N/A
SCS soil type	ABCD
Freeze/Thaw	good
Drainage/Flood control	yes

A temporary stream crossing is used when heavy equipment must be moved from one side of a stream channel to another, or where light-duty construction vehicles have to cross the stream channel frequently for a short period of time. Temporary stream crossings should be installed only when it is necessary to cross a stream and a permanent crossing is not feasible or not yet constructed.

The specific loads and the stream conditions will dictate what type of stream crossing to employ.

Bridges: Where available materials and designs are adequate to bear the expected loadings, bridges are the preferred method to cross a stream as they provide the least obstruction to flows and fish migration.

Culverts: Culverts are the most common type of stream crossings and are relatively easy to construct. A pipe (to carry the stream flow) is laid into the channel and covered by gravel (simply put--backfill, density, bedding and galvanized headwall).

LIMITATIONS

Bridges are expensive to design and install. These costs may make it difficult to justify using a bridge as a temporary crossing in some situations.

Culverts cause greater disturbance during installation and removal. In sensitive stream systems, these impacts may not be justifiable.

Always attempt to minimize or eliminate the need to cross streams. Temporary stream crossings are a direct source of pollution; therefore, every effort should be made to use an alternate method such as a longer detour. When it is absolutely necessary to cross a stream, a well-planned approach will minimize damage to the stream bank and reduce erosion.

Use of the following stream crossing measures below the high water mark of a stream or other water body (waters of the U.S.) should be carefully evaluated due to Section 404 permit requirements. If the project will remain a Categorically Excluded (Cat-Ex) project, you may proceed if the situation is discussed in the Cat-Ex. Otherwise, Section 404 permitting (401 Certification)/a Water Resources, Stream Alteration Permit, may be required. The design of temporary stream crossings involves extensive knowledge of hydrologic processes, and therefore must be designed by a Professional Engineer.

DESIGN AND PLANNING PARAMETERS - GENERAL

In-Stream Excavation - In-stream excavation shall be limited to only that necessary to allow installation of the temporary bridge or culvert as described below.

Elimination of Fish Migration Barriers - Temporary bridges pose the least potential for creating barriers to aquatic migration. The construction of a temporary bridge or culvert shall not cause a significant water level difference between the upstream and downstream water surface elevations.

Crossing Alignment - The temporary waterway crossing shall be at right angles to the stream. Where approach conditions dictate, the crossing may vary 15 degrees from a line drawn perpendicular to the centerline of the stream at the intended crossing location.

Road Approaches - The centerline of both roadway approaches shall coincide with the crossing alignment centerline for a minimum distance of 50 feet from each bank of the waterway being crossed. If physical or right-of-way restraints preclude the 50 feet minimum, a shorter distance may be provided. All fill materials associated with the roadway approach shall be limited to a maximum height of 2 feet above the existing flood plain elevation.

Surface Water Diverting Structure - A water diverting structure such as a swale shall be constructed (across the roadway on both roadway approaches) 50 feet (maximum) on either side of the waterway crossing. This will prevent roadway surface runoff from directly entering the waterway. The 50 feet is measured from the top of the waterway bank. Design criteria for this diverting structure shall be in accordance with the BMP fact sheet in this Catalog for the individual design standard of choice. If the roadway approach is constructed with a reverse grade away from the waterway, a separate diverting structure is not required.

Road Width - All crossings shall have one traffic lane. The minimum width shall be 12 feet with a maximum width of 20 feet.

Time of Operation - All temporary crossings shall be removed within 14 calendar days after the structure is no longer needed. Unless prior written approval is obtained from the Water Resources Administration, all structures shall be removed within one year from the date of the installation.

Materials:

- Aggregate - There shall be no earth or soil materials used for construction within the waterway channel. (3/4" to 4") also referenced as AASHTO

designation No. 1 shall be the minimum acceptable aggregate size for temporary crossings. Larger aggregates will be allowed.

- Filter Cloth - Filter cloth is a fabric consisting of either woven or nonwoven plastic, polypropylene, or nylon used to distribute the load, retain fines, allow increased drainage of the aggregate and reduce mixing of the aggregate with the subgrade soil. Filter cloths such as Mirafi, Typar, Adva Filter, Polyfilter X, or approved equivalent shall be used, as required by the specific method.

Considerations for Choosing a Specific Method (Bridge or Culvert): The following criteria for erosion and sediment control shall be considered when selecting a specific temporary access waterway crossing standard method:

- Site aesthetics - Select a standard design method that will least disrupt the existing terrain of the stream reach. Consider the effort that will be required to restore the area after the temporary crossing is removed.

- Site location - Locate the temporary crossing where there will be the least disturbance to the soils of the existing waterway banks. When possible locate the crossing at the point receiving minimal surface runoff.

- Physical site constraints - The physical constraints of a site may preclude the selection of one or more of the standard methods.

- Time of year - The time of year may preclude the selection of one or more of the standard methods due to fish spawning or migration restrictions.

- Vehicular loads and traffic patterns - Vehicular loads, traffic patterns, and frequency of crossings should be considered in choosing a specific method.

- Maintenance of Crossing - The standard methods will require various amounts of maintenance. The bridge method should require the least maintenance, whereas the ford method will probably require more intensive maintenance.

- Removal of the structure - Ease of removal and subsequent damage to the waterway should be primary factors in considering the choice of a standard method.

DESIGN PARAMETERS - TEMPORARY BRIDGE

This is the preferred method for temporary access waterway crossings. Normally, bridge construction causes the least disturbance to the waterway bed and banks when compared to culverts.

Most bridges can be quickly removed and reused.

Temporary access bridges pose the least chance for interference with fish migration when compared to the other temporary access waterway crossings.

CONSTRUCTION GUIDELINES - TEMPORARY BRIDGE

Restriction: Construction, use, or removal of a temporary access bridge will not normally have any time of year restrictions since construction, use or removal should not affect the stream or its banks.

Bridge Placement: A temporary bridge structure shall be constructed at or above bank elevation to prevent the entrapment of floating materials and debris.

Abutments: Abutments shall be placed parallel to and on stable banks.

Bridge Span: Bridges shall be constructed to span the entire channel. If the channel width exceeds 8 feet (as measured from top-of-bank to top-of-bank) then a footing, pier or bridge support may be constructed within the waterway. One additional footing, pier or bridge support will be permitted for each additional 8 foot width of the channel. However, no footing, pier or bridge support will be permitted within the channel for waterways less than 8 feet wide.

Stringers: Stringers shall either be logs, sawn timber, prestressed concrete beams, metal beams, or other approved.

Deck Material: Decking materials shall be of sufficient strength to support the anticipated load. All decking members shall be placed perpendicular to the stringers, butted tightly, and securely fastened to the stringers. Decking materials must be butted tightly to prevent any soil material tracked onto the bridge from falling into the waterway below.

Run Planks (optional): Run planking shall be securely fastened to the length of the span. One run plank shall be provided for each track of the equipment wheels. Although run planks are optional, they may be necessary to properly distribute loads.

Curbs or Fenders: Curbs or fenders may be installed along the outer sides of the deck. Curbs or fenders are an option which will provide additional safety.

Bridge Anchors: Bridges shall be securely anchored at only one end using steel cable or chain. Anchoring at only one end will prevent channel obstruction in the event that floodwaters float the bridge. Acceptable anchors are large trees, large boulders, or driven steel anchors. Anchoring shall be sufficient to prevent the bridge from floating downstream and possibly causing an obstruction to the flow.

Stabilization: All areas disturbed during installation shall be stabilized within 14 calendar days of that disturbance.

MAINTENANCE - TEMPORARY BRIDGE

Inspection - Periodic inspection shall be performed by the user to ensure that the bridge, streambed, and stream banks are maintained and not damaged.

Maintenance: Maintenance shall be performed, as needed to ensure that the structure complies with the standard and specifications. This shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of outside of the flood plain and stabilized.

Removal: When the temporary bridge is no longer needed, all structures including abutments and other bridging materials shall be removed within 14 calendar days. In all cases, the bridge materials shall be removed within one year of installation.

Final Clean-Up: Final clean-up shall consist of removal of the temporary bridge from the waterway, protection of banks from erosion, and removal of all construction materials. All removed materials shall be stored outside the waterway flood plain.

Equipment: Removal of the bridge and clean up of the area shall be accomplished without construction equipment working in the waterway channel.

Final Stabilization: All areas disturbed during removal shall be stabilized within 14 calendar days of that disturbance.

DESIGN PARAMETERS - TEMPORARY CULVERT

A temporary access culvert is a structure consisting of a section(s) of circular pipe, pipe arches, or oval pipes of reinforced concrete, corrugated metal, or structural plate, which is used to convey flowing water through the crossing.

Temporary culverts are used where (1) the channel is too wide for normal bridge construction, or (2) anticipated loading may prove unsafe for single span bridges.

Temporary culverts can be salvaged and reused.

CONSTRUCTION GUIDELINES - TEMPORARY CULVERT

Culvert Strength - All culverts shall be strong enough to support their cross sectional area under maximum expected loads.

Culvert Size - The size of the culvert pipe shall be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60 percent of the cross sectional area of the existing channel. The minimum size culvert that may be used is a 12" diameter pipe.

Culvert Length - The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe of the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.

Filter Cloth - Filter cloth shall be placed on the streambed and streambanks prior to placement of the pipe culvert(s) and aggregate. The filter cloth shall cover the streambed and extend a minimum six inches and a maximum one foot beyond the end of the culvert and bedding material. Filter cloth reduces settlement and improves crossing stability.

Culvert Placement - The invert elevation of the culvert shall be installed on the natural streambed grade to minimize interference with fish migration (free passage of fish).

Culvert Protection - The culvert(s) shall be covered with a minimum of one foot of aggregate. If multiple culverts are used they shall be separated by at least 12" of compacted aggregate fill. At a minimum, the bedding and fill material used in the construction of the temporary access culvert crossings shall conform with the aggregate requirements cited in Section I.H. 1. above.

Stabilization - All areas disturbed during culvert installation shall be stabilized within 14 calendar days of the disturbance.

MAINTENANCE - TEMPORARY CULVERT

Inspection - Periodic inspection shall be performed to ensure that the culverts, streambed, and streambanks are not damaged, and that sediment is not entering the stream or blocking fish passage or migration.

Maintenance - Maintenance shall be performed, as needed in a timely manner to ensure that structures are in compliance with this standard and specification. This shall include removal and disposal of any trapped sediment or debris. Sediment shall be disposed of and stabilized outside the waterway flood plain.

Removal - When the crossing has served its purpose, all structures including culverts, bedding and filter cloth materials shall be removed within 14 calendar days. In all cases, the culvert materials shall be removed within one year of installation.

Final Clean-up - Final clean-up shall consist of removal of the temporary structure from the waterway, removal of all construction materials, restoration of original stream channel cross section, and protection of the steam banks from erosion. Removed material shall be stored outside of the waterway flood plain.

Equipment - Removal of the structure and clean up of the area shall be accomplished without construction equipment working in the waterway channel.

Final Stabilization - All areas disturbed during culvert removal shall be stabilized within 14 calendar days of the disturbance.

Temporary stream crossing (North Carolina, 1988)

Temporary stream crossing (California, 1993)

Temporary Access Bridge

Temporary Access Culvert